BECOME A NUCLEAR OPERATOR IN THE NAVY

THE MOST ADVANCED TECHNICAL TRAINING IN THE MILITARY

AMERICA'S NAVY
FORGED BY THE SEA

INTRODUCTION TO THE NAVY

"The Navy has both a tradition and a future and we look with pride and confidence in both directions."

—Admiral George Anderson
16th Chief of Naval Operations

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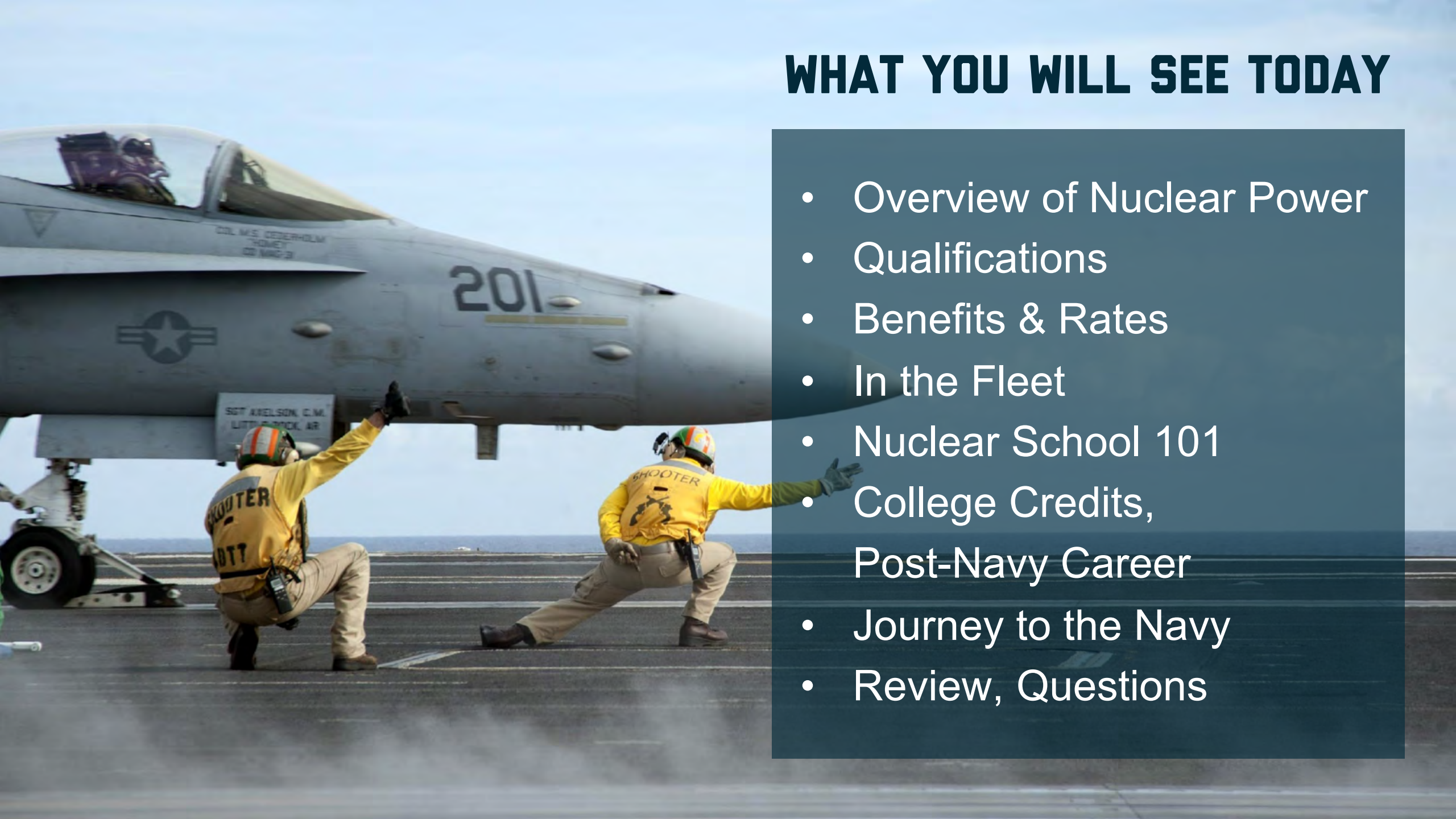
NAVY BY THE NUMBERS

- ***330,000+*** active duty Sailors
- Over ***130 essential job fields,*** including health care, electronics, nuclear engineering, aviation and more
- More than ***100 ports of call*** around the world
- ***289*** deployable battle force ships

WHAT YOU WILL SEE TODAY



- Overview of Nuclear Power
- Qualifications
- Benefits & Rates
- In the Fleet
- Nuclear School 101
- College Credits, Post-Navy Career
- Journey to the Navy
- Review, Questions

NUCLEAR POWER OVERVIEW

"Nuclear power is a hell of a way to boil water."

—Albert Einstein
Theoretical Physicist

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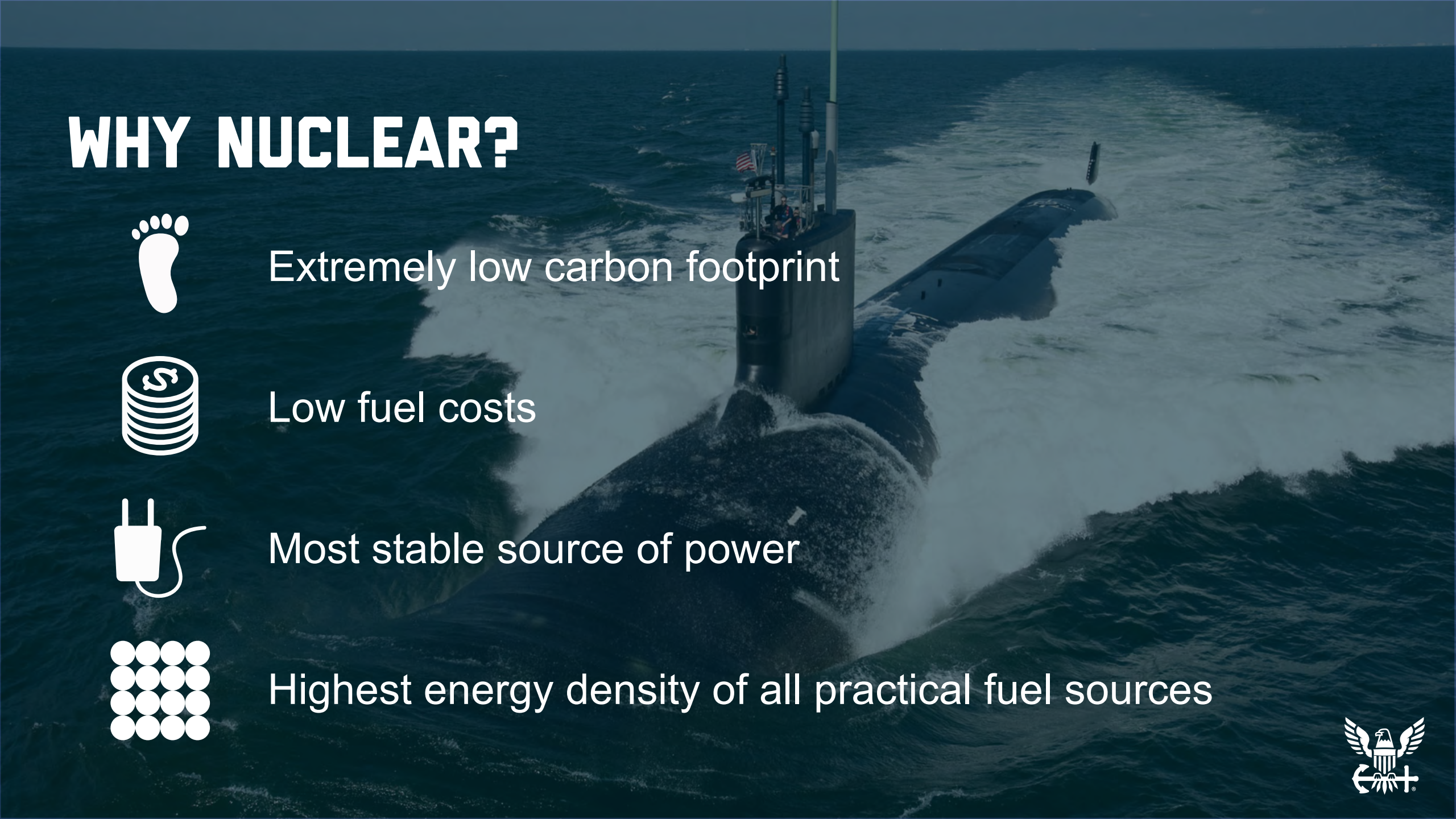


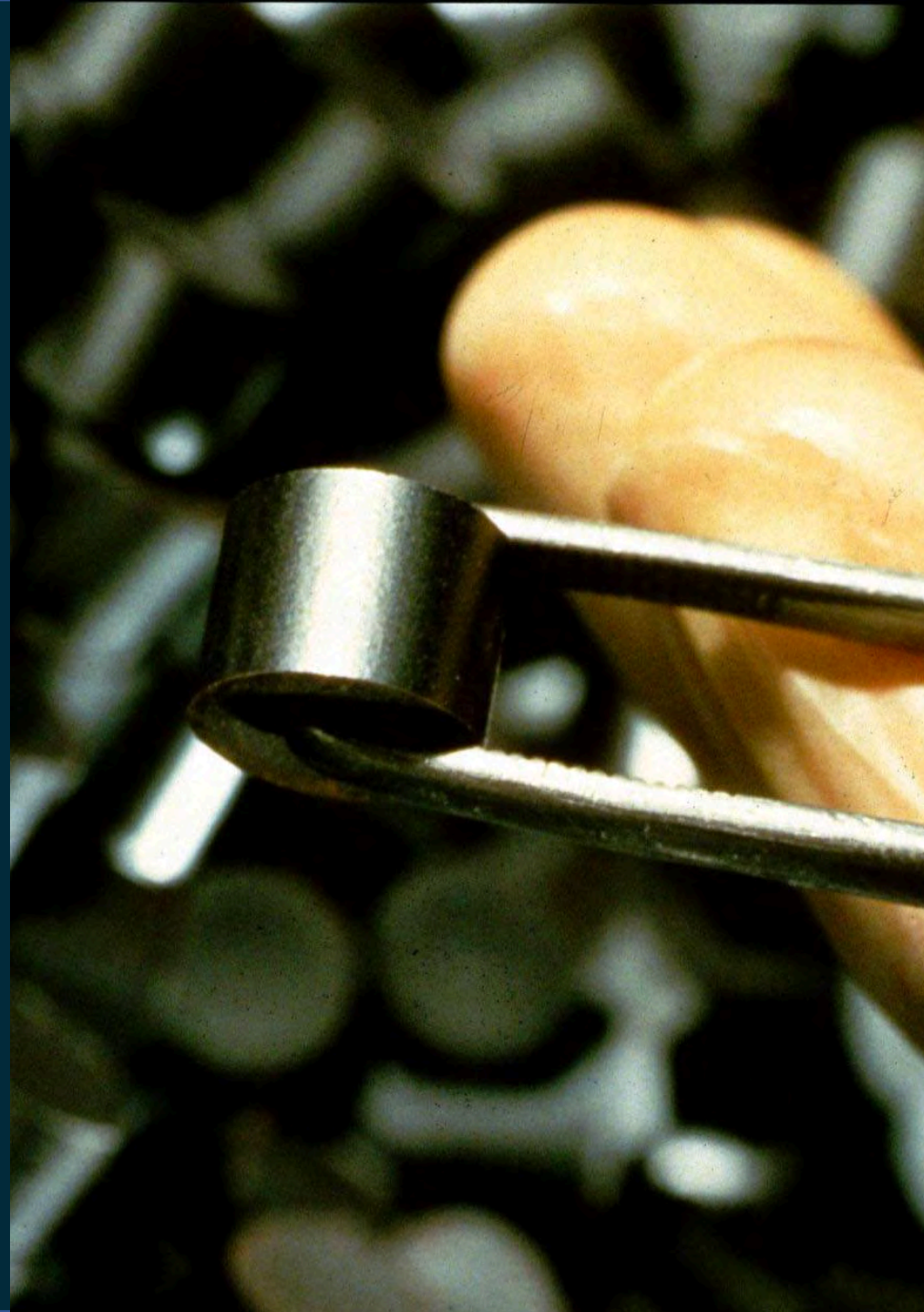
WHY NUCLEAR?

- Extremely low carbon footprint
- Low fuel costs
- Most stable source of power
- Highest energy density of all practical fuel sources

NUCLEAR FUEL

A single uranium fuel pellet contains the energy equivalent of:

- 149 gallons of oil
- One ton of coal
- 17,000 cubic feet of natural gas

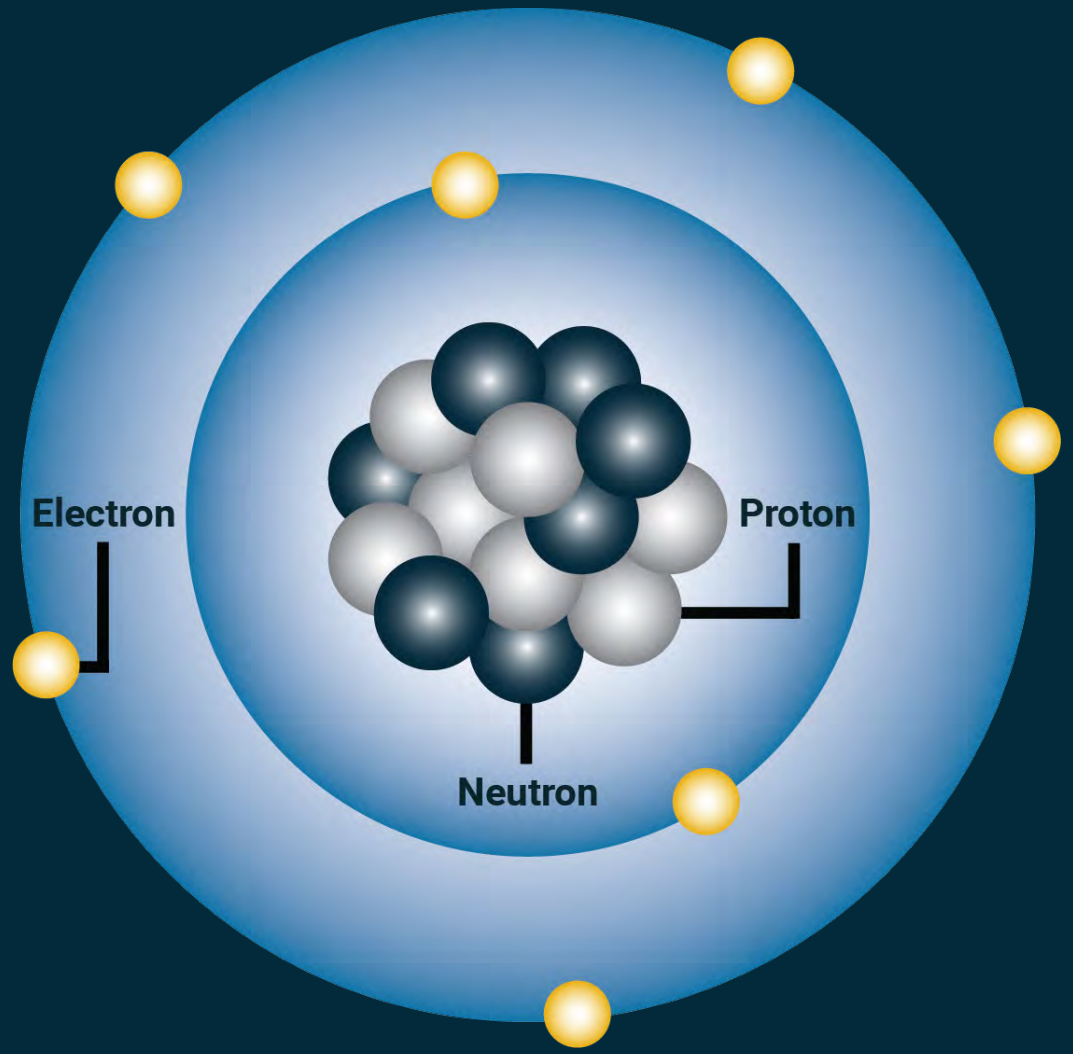


ATOMS

Atoms make up all matter, and they are made up of three smaller particles:

- Protons
- Neutrons
- Electrons

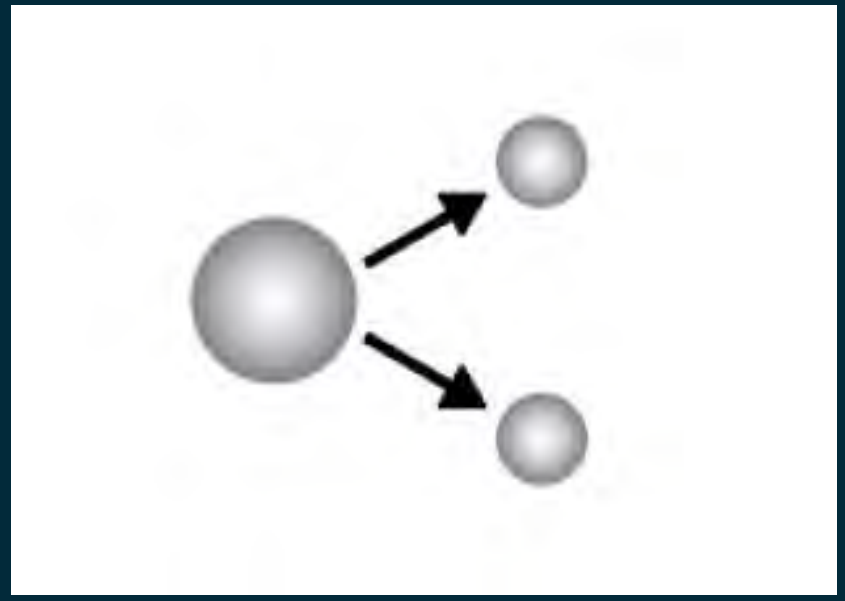
The nucleus is made up of protons and neutrons and contains a huge amount of **energy.**



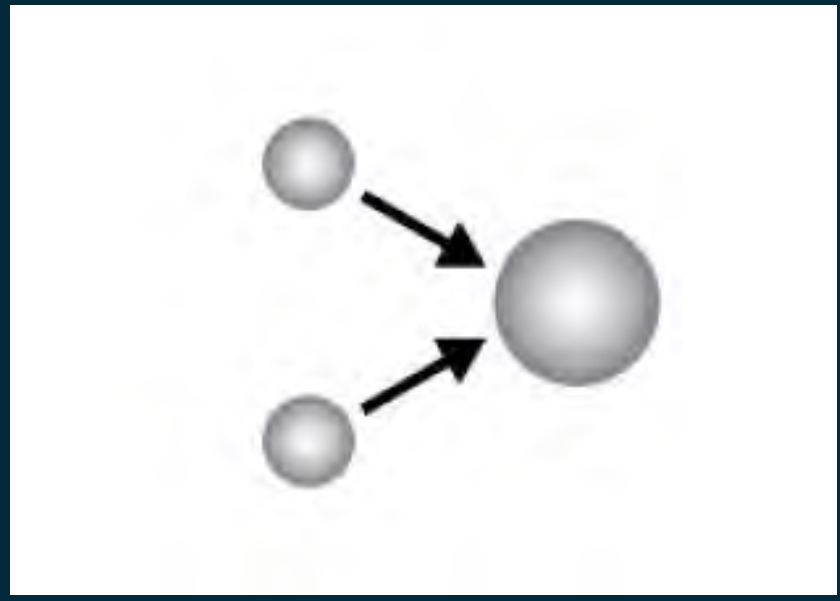
NUCLEAR ENERGY

Nuclear energy can be used to generate electricity, but first it must be released from the atom through either **“fission”** or **“fusion.”**

FISSION

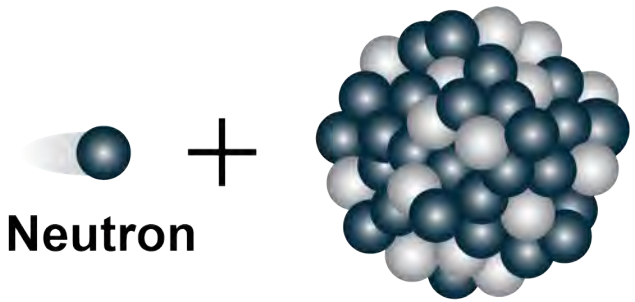


FUSION



FOUR STEPS TO NUCLEAR FISSION

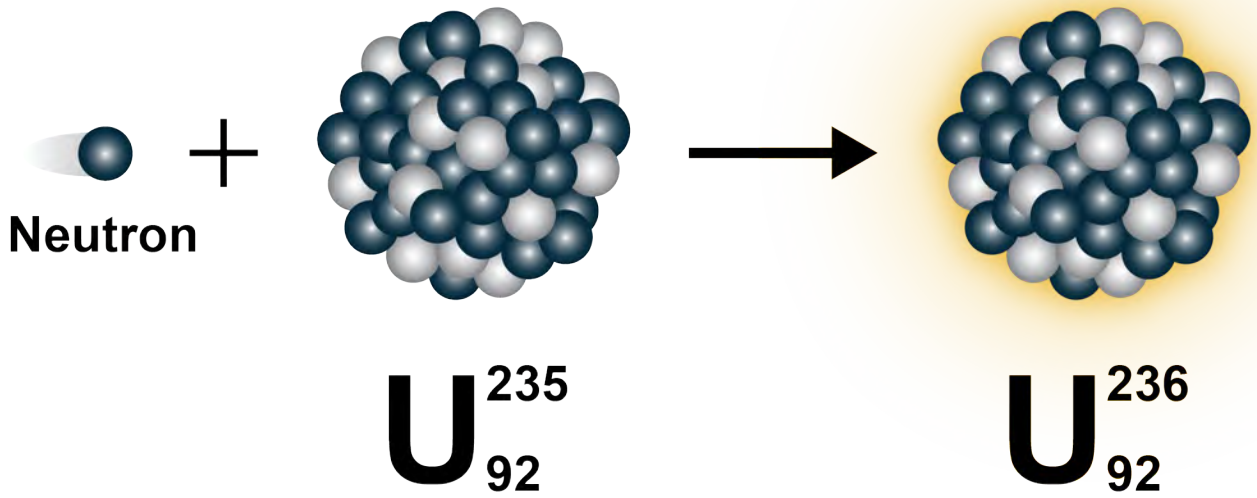
Step 1: A uranium-235 (U-235) nucleus absorbs an extra, slow-moving neutron. (Fast neutrons will not be captured.)



$$U_{92}^{235}$$

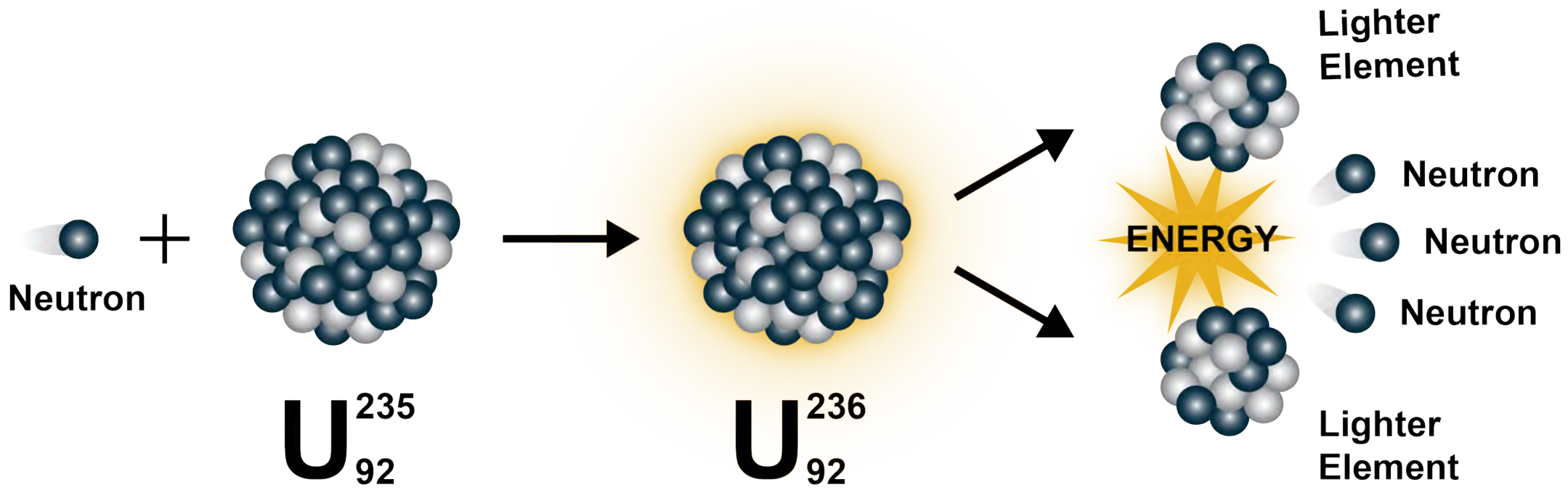
FOUR STEPS TO NUCLEAR FISSION

Step 2: The nucleus becomes uranium-236, which is highly unstable.



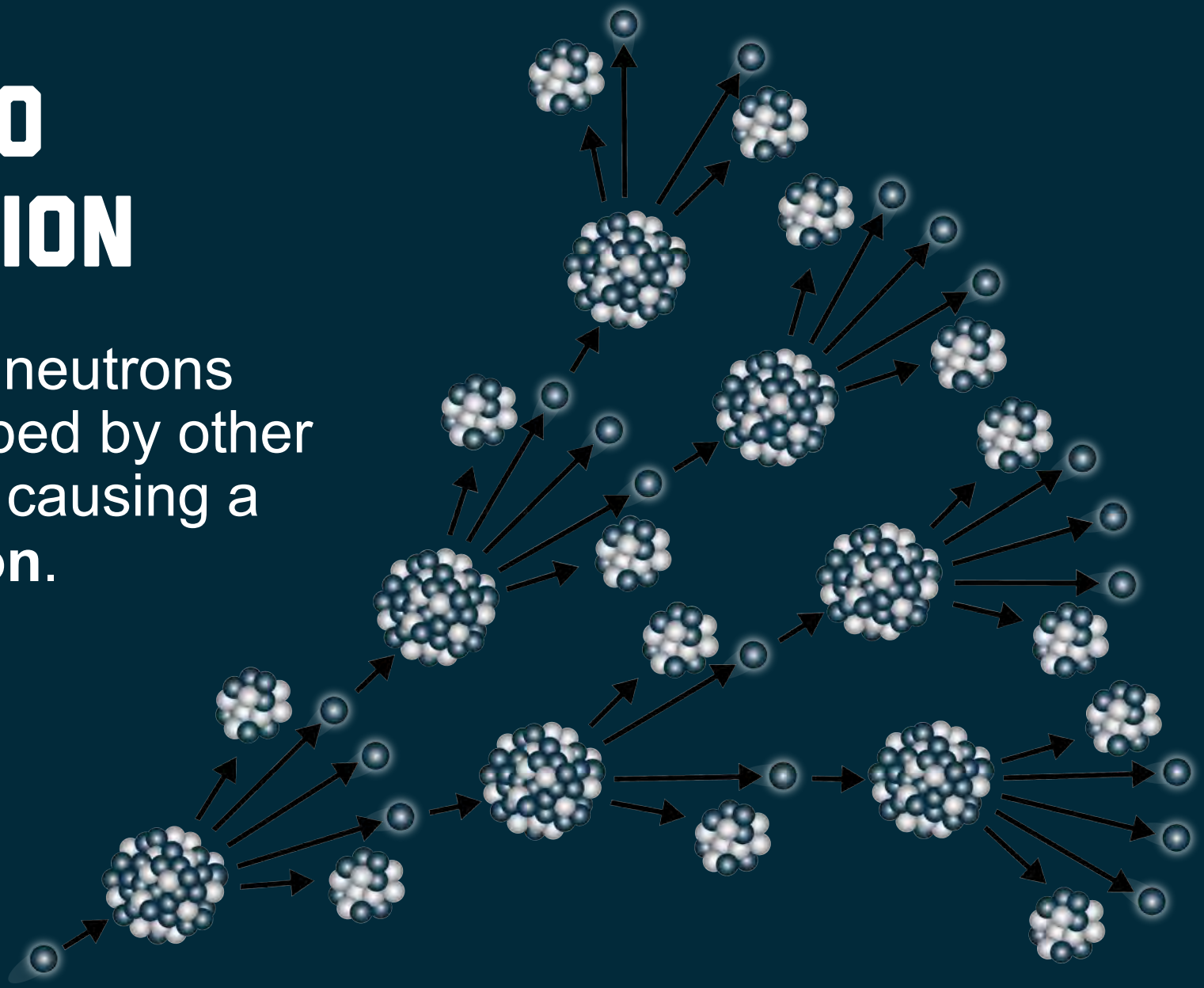
FOUR STEPS TO NUCLEAR FISSION

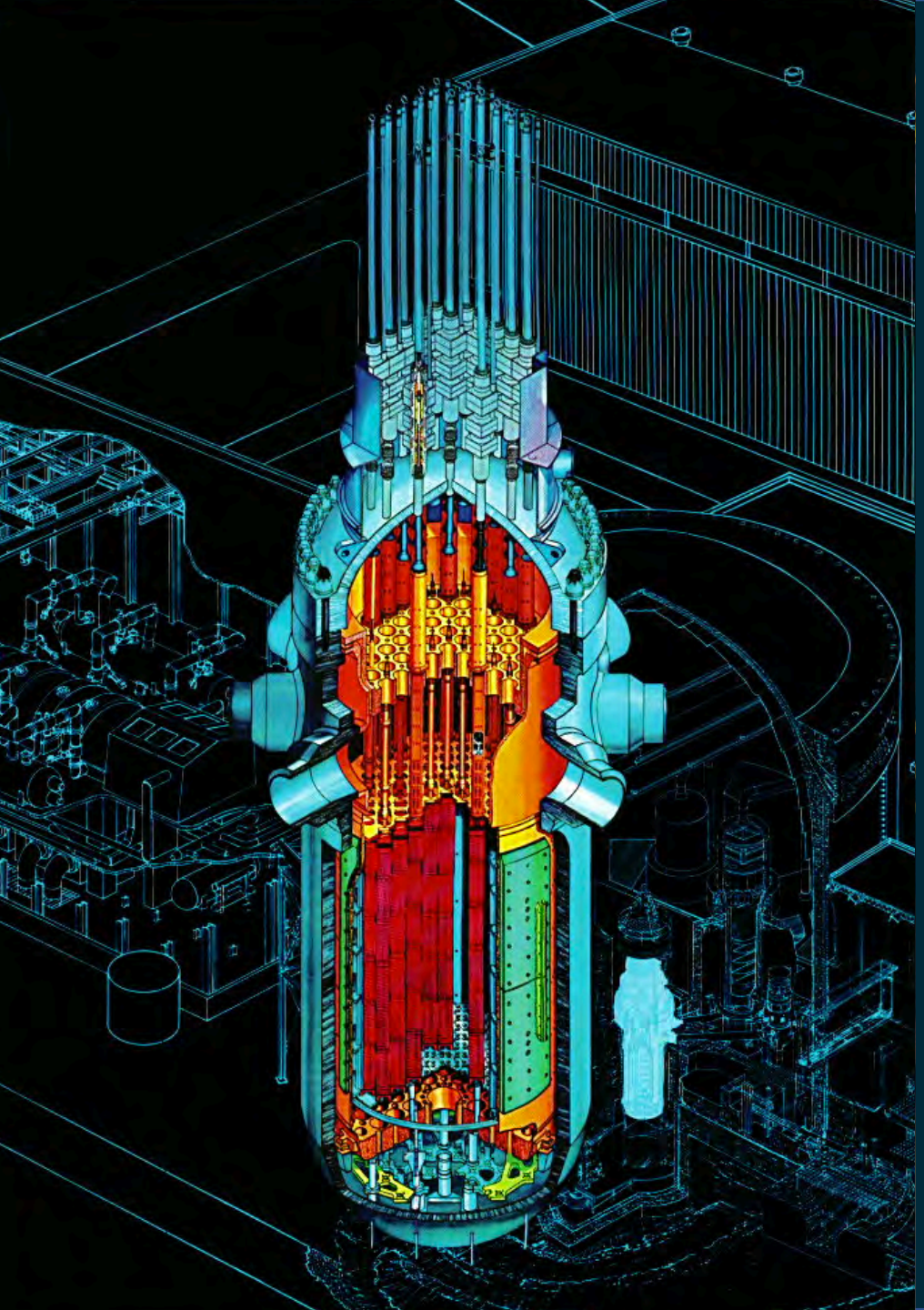
Step 3: The nucleus splits into two "**fission products**," releasing a significant amount of energy as well as 2–3 neutrons.



FOUR STEPS TO NUCLEAR FISSION

Step 4: The released neutrons can be absorbed by other U-235 nuclei, causing a **chain reaction**.





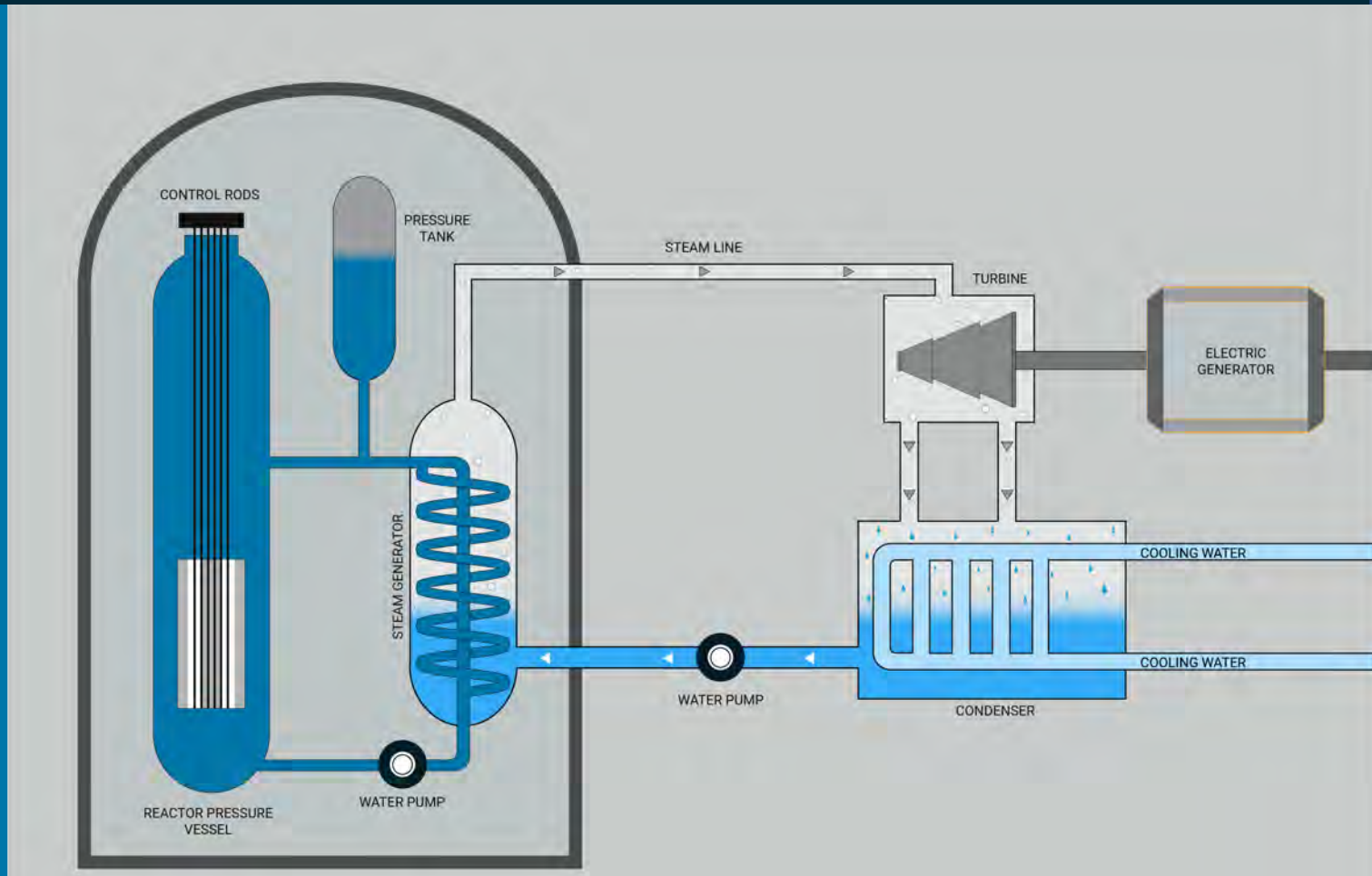
CONTROLLED NUCLEAR FISSION

To control and sustain a nuclear chain reaction, nuclear reactors use **control rods**, which are highly effective neutron-absorbing structures that are inserted and withdrawn to slow down or speed up the reaction.

Inside the reactor vessel, the **fuel assembly** is immersed in water, which acts as both a coolant (to transfer heat) and moderator (to slow neutrons down).

FOUR STEPS TO NUCLEAR POWER

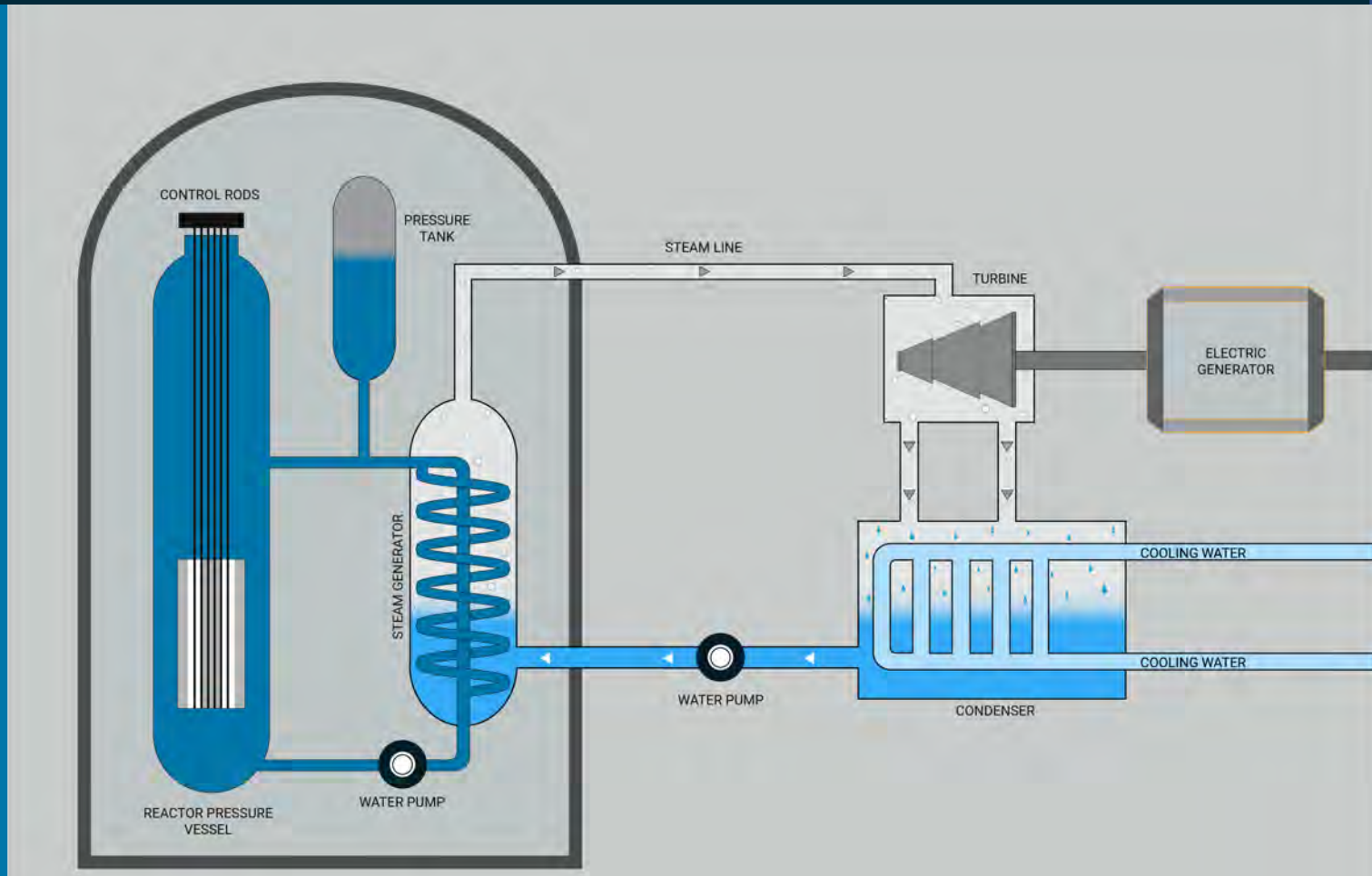
1. Nuclear fission heats water inside the reactor vessel.



FOUR STEPS TO NUCLEAR POWER

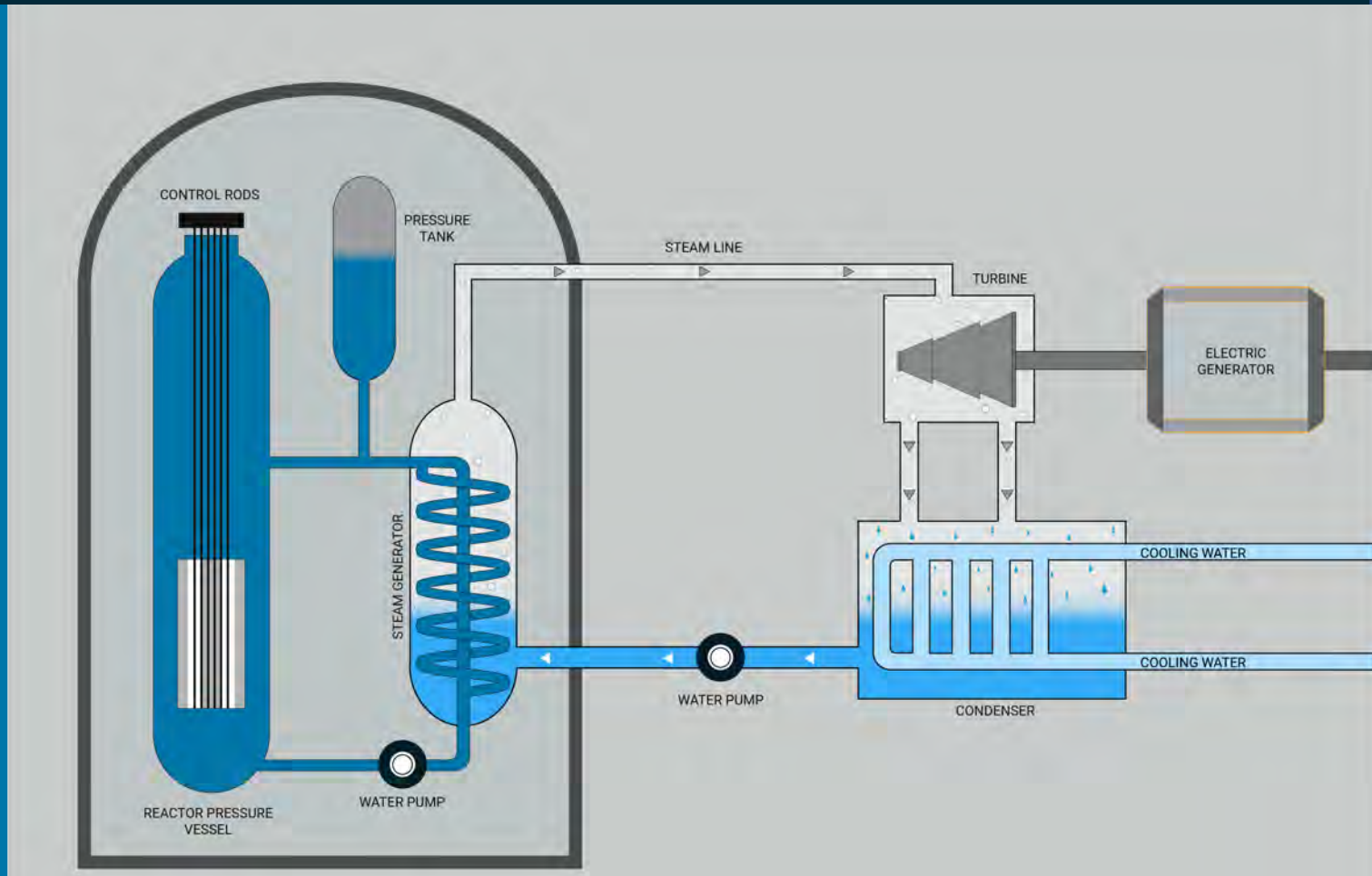
1. Nuclear fission heats water inside the reactor vessel.

2. Pressurized water in the primary loop carries the heat through the steam generator.



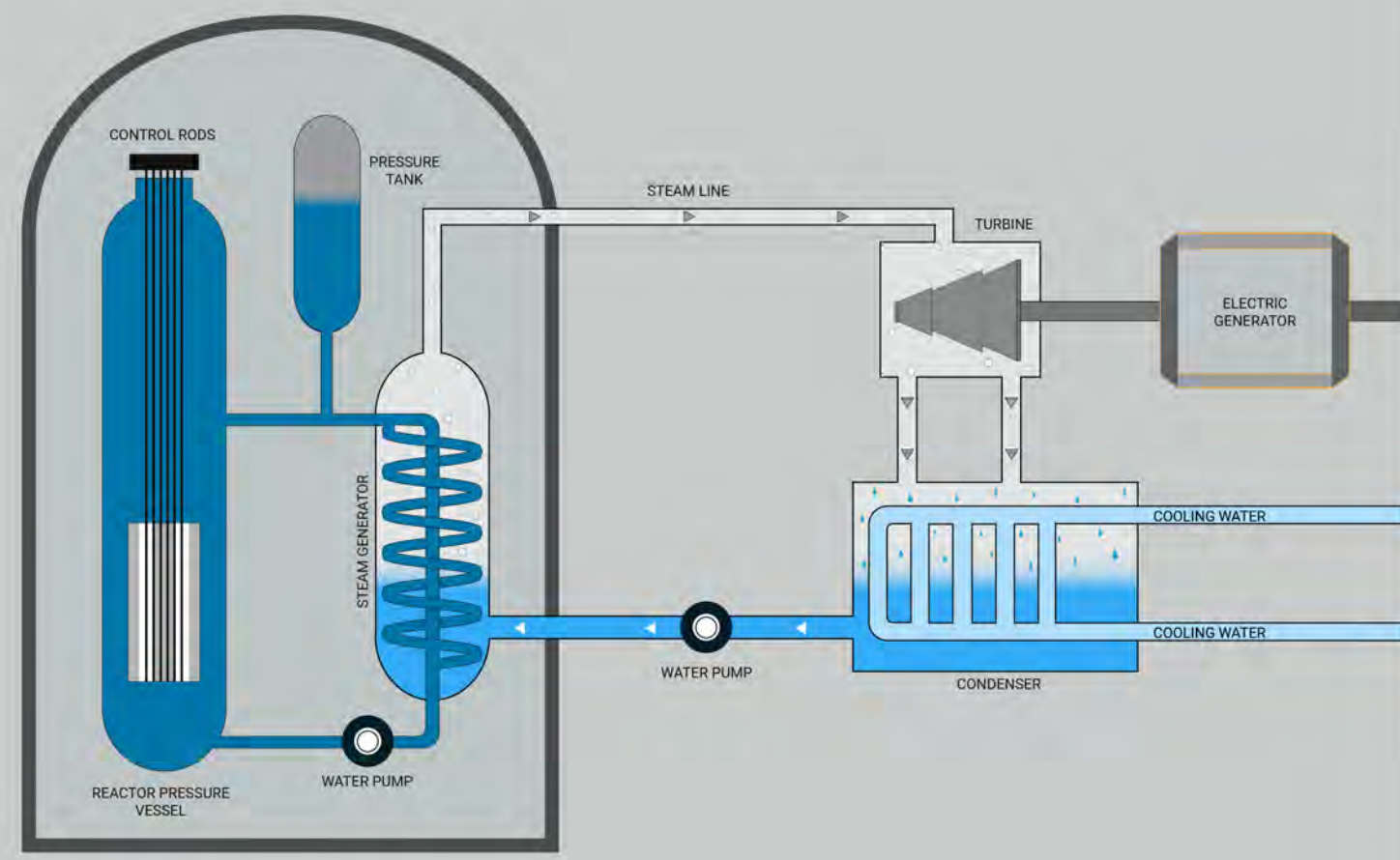
FOUR STEPS TO NUCLEAR POWER

1. Nuclear fission heats water inside the reactor vessel.
2. Pressurized water in the primary loop carries the heat through the steam generator.
3. The heat vaporizes water in a secondary loop, making steam.



FOUR STEPS TO NUCLEAR POWER

1. Nuclear fission heats water inside the reactor vessel.
2. Pressurized water in the primary loop carries the heat through the steam generator.
3. The heat vaporizes water in a secondary loop, making steam.
4. The steam passes through the main turbine, which generates electricity and propulsion.



NAVAL NUCLEAR HISTORY

"The Navy is very old and very wise."

—Rudyard Kipling
Nobel Prize–Winning Author

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NAVY NUCLEAR POWER PROGRAM

- One of the **oldest and largest** nuclear organizations in the world with **the best safety record** of any industry
- **Most advanced program,** filled with the nation's best and brightest trained to operate power plants on nuclear-powered Navy vessels

THE INCEPTION OF NUCLEAR NAVY

1946

Naval Officers sent to Oak Ridge National Lab to see if nuclear power had any use in the Navy.

1947–1949

Naval Officers research nuclear power as a means to power a submarine and seek approval to build a nuclear sub.

1951

Nautilus project is approved by Admiral Nimitz.

1953

First time in world history significant amount of power is generated by controlled atomic energy on May 31.

1954

USS Nautilus is launched January 21, less than 4 years after the project was approved.

1958

On August 3, USS Nautilus becomes first submarine to reach the North Pole.

WHY BUILD A NUCLEAR NAVY?

- Before nuclear power, submarines ran on diesel engines and could only submerge using batteries.
- Now one ship can potentially last **40 years** without refueling and does not need an oxygen source.
- A nuclear aircraft carrier can carry **twice the amount of aircraft fuel**, 30 percent more weapons and 300,000 cubic feet of additional space.
- Nuclear vessels are more capable of **moving quickly** to crisis spots around the globe.
- Nuclear power is **cleaner and quieter,** and it **lasts longer** than other fuels.

SAFETY FIRST

Since the USS Nautilus launched in 1954, the Navy has sailed over ***139 million miles*** and ***operated 103 reactors*** on 80 vessels ***without a single*** nuclear accident.

HOW TO QUALIFY

"I do not recruit extraordinary people,
I recruit people of extraordinary potential."

—Admiral Hyman G. Rickover
Father of the Nuclear Navy

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QUALIFICATIONS

- U.S. citizen and no dual citizenship
- A high school diploma or equivalent
  - Successful completion of one year of algebra
- Qualifying scores ASVAB and advanced placement test, if necessary
- Meet physical standards
- No older than 27 years on date of enlistment
- Meet eligibility requirements for a security clearance
  - Finances
  - No criminal record
  - Drug test

BENEFITS

"I can imagine no more rewarding a career. And any man who may be asked in this century what he did to make his life worthwhile, I think can respond with a good deal of pride and satisfaction: 'I served in the United States Navy.'"

—President John F. Kennedy
35th President of the United States of America
Naval Combat Officer

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YOU WILL GET...

- A signing bonus of **up to $40,000**
- Reenlistment signing bonus of **up to $100,000** (eligible after 2 years of service)
- Enlist as an E-3 (**two pay grades** higher than general enlistee)
- Tuition assistance
- Forever GI Bill = **3 years' full tuition** and housing
- Licensing and certifications **paid**
- Opportunity to earn **college credits** toward a degree

RATINGS/JOBS

"The Navy is much more than a job; much more than service to country. It is a way of life. It gets in your blood."

—Admiral Albert Pratt
Assistant Secretary of the Navy, 1955

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MACHINIST MATE

- Operate and maintain machinery within Naval nuclear propulsion plants and associated equipment
- Supervise and administer plant operations
- Repair systems associated with reactor plants, propulsion plants and auxiliary support systems
- Perform tests, transfers and inventories of lubricating oils, fuels and water
- Maintain records and reports on both surface and sub-surface ships

ELECTRICIANS MATE

- Operate electrical power generation systems, lighting systems, electrical equipment and electrical appliances within nuclear propulsion plants operating rector control, propulsion and power generation systems
- Installation, operation, adjustment, routine maintenance, inspection, test and repair of electrical equipment
- Maintenance and repair of related electronic equipment

ELECTRONICS TECHNICIAN

- Operate, maintain, repair, calibrate and adjust reactor safety electronic equipment associated with reactor operations
- Maintain reactor plant performance records
- Perform duties in nuclear propulsion plants operating reactor control, propulsion and power generation systems

IN THE FLEET

"Next to my parents, the Navy Nuclear Power Program had the greatest effect on my life."

—President Jimmy Carter
39th President of the United States of America
Graduate of the U.S. Naval Academy

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SURFACE

- 400+ nuclear ratings on board to manage:
  - 2 independent power plants, 550MW each
  - 70+ MW of electrical power
  - 200,000+ horsepower across 4 propellers
- Most protected ship in the fleet
- Can house up to 75 aircraft
- Forefront of Navy's power projection

SUBMARINE

- 125+ people on board the submarine
- Perform top-secret missions
- SSBN carries the 3rd largest nuclear weapons arsenal in the world
- Most advanced submarine force in the world
- 68 submarines in the fleet

NAVAL NUCLEAR BASES

TRAINING

"If you want to change the world, find someone to help you paddle."

—Admiral William H. McRaven
9th Commander of US Special Operations Command

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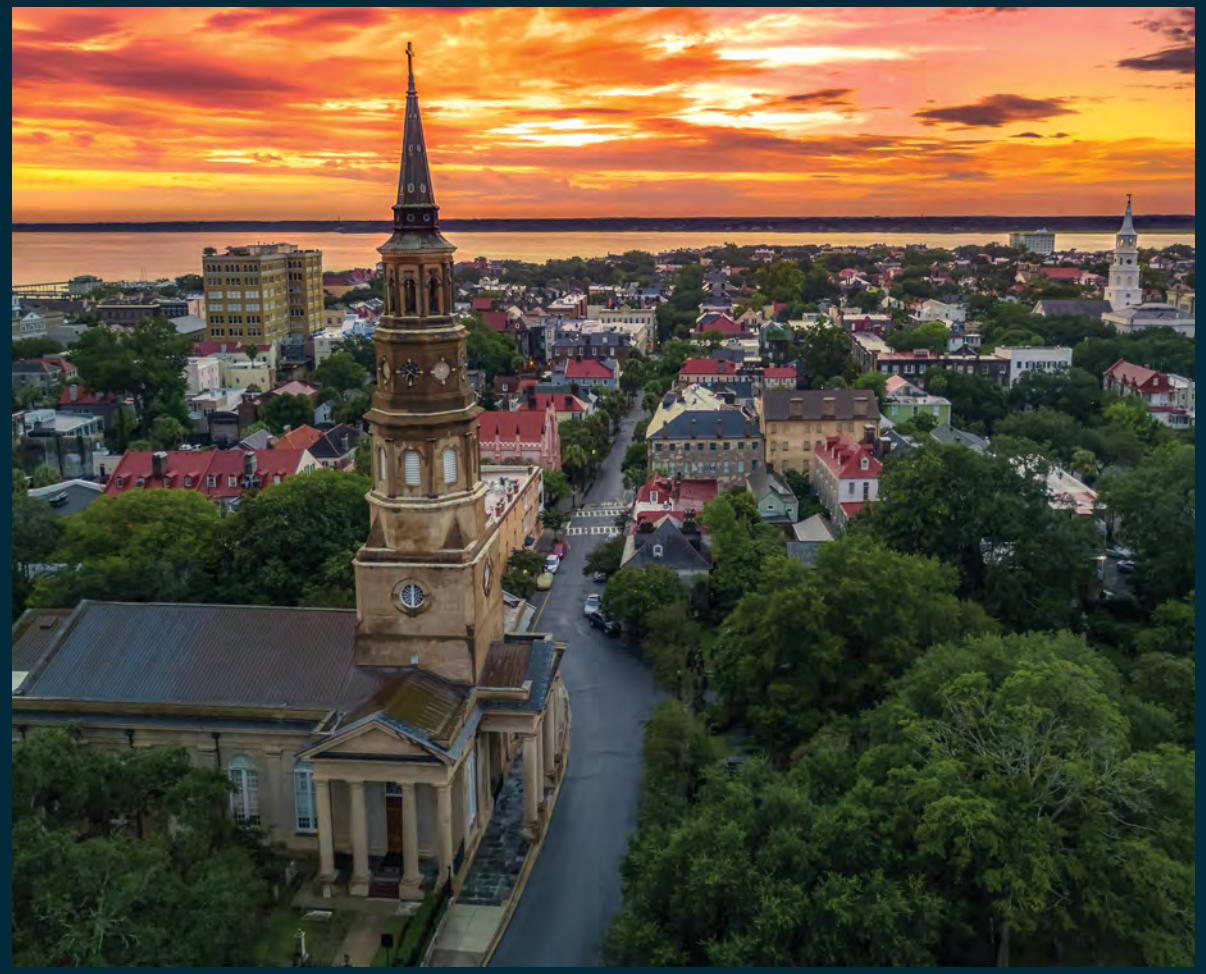
YOUR TRAINING

- 15–18 months
- Two locations
  - Charleston, SC
  - Ballston Spa, NY
- Classes from 7am to 3pm
- Three schools
  - “A” School (Technical School), 3 to 6 months
  - Naval Nuclear Power School, 6 months
  - Nuclear Power Training Unit, 6 months

"A" SCHOOL

- Located in Charleston, SC
- Schooling is job/rate specific
- Electrical school
  - Ratings: Electricians Mate (EM) and Electronics Technician (ET)
  - Duration: 6 months
- Machinist school
  - Rating: Machinists Mate (MM)
  - Duration: 3 months



NAVAL NUCLEAR POWER SCHOOL (NNPS)

- Located in Charleston, SC
- Duration: 6 months
- Curriculum:
  - Theory & practical application of nuclear physics and reactor engineering
  - Comprehensive understanding of Naval nuclear power plant

NUCLEAR POWER TRAINING UNIT

- Located in Charleston, SC, and Ballston Spa, NY
- Duration: 6 months
- Curriculum:
  - Prototype training on a real-life operational nuclear platform
  - Final oral board testing

COLLEGE CREDIT, POST-NAVY CAREER

"Think about every problem, every challenge, we face. The solution to each starts with education."

—George H. W. Bush
41st President of the United States of America
Naval Aviator and WWII Hero

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COLLEGE CREDITS

- Tuition assistance **during and after** your time in the Navy
- Earn **70+ credit hours**
  - Similar education could cost $200,000
  - Receive a paycheck while in school

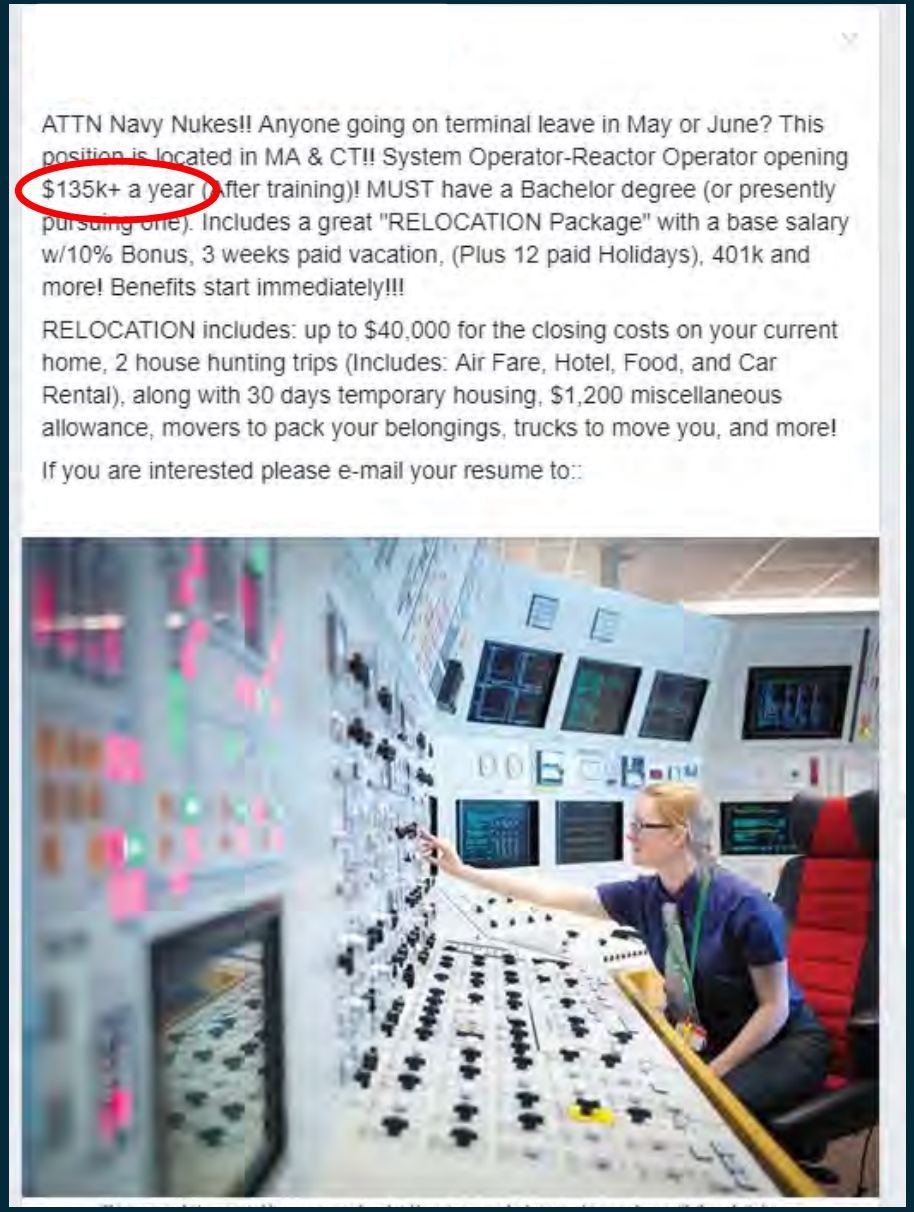
SUMMARY OF EARNED CREDITS

ELECTRONICS TECHNICIAN, NUCLEAR (ETN)

TITLE/SUBJECT	CREDIT HOURS
First Aid and Safety	2
Personal Fitness/Conditioning	1
Personal/Community Health	1
AC Circuits	2
Atomic and Nuclear Physics	1
DC Circuits	2
Digital Principles	2
Electric Machines	2
General Chemistry and Principles of Materials	3
General Physics	5
Heat Transfer and Fluid Flow	3
Hydraulic Systems	2
Nuclear Reactor Engineering	3
Radiation Protection Technology	1
Technical Mathematics	4
Digital Circuits	3
Electric Circuits (AC/DC)	3
Electronic Circuits	4
Electronic Systems Troubleshooting and Maintenance	5
Electronics Laboratory Test Equipment	2
Field Experience in Management	3
Maintenance Management	3
Microcomputer Applications Software	2
Microprocessors	3
Navigation Equipment	3
Personnel Supervision	3
Project Management	3
Radar Systems Maintenance	3
Technical Mathematics	3
Technical Writing	3
TOTAL CREDITS EARNED	**80**

CAREER OUTLOOK

- Average **starting salary range of $90,000–$150,000**
  - Average starting salary for a college graduate is ~$50,390
  - Median household income is $61,372
- Numerous civilian career options
  - Conventional and manufacturing plants will also hire you for your training
- Opportunities within the industry-leading technology and engineering spaces



JOURNEY TO THE NAVY

"It isn't what you do, but how you do it."

—John Wooden
Revered Basketball Coach
Navy Lieutenant

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HOW TO JOIN

- Get in touch with a recruiter
- Join the Delayed Entry Program (DEP)
- Graduate from high school
- Go to Recruit Training Command (basic training)
- Graduate basic training
- Start nuclear training program
- Graduate nuclear training program

LET'S REVIEW

- One of the most prestigious programs offered in the military
- Highly marketable and profitable opportunity
- Schooling and critical experience the real world needs
- Opportunity to make six figures after your Navy service
- Current and former nuclear engineers some of the most successful Sailors

WANT MORE INFORMATION?

- America's Navy
  www.navy.com
- U.S. Department of Energy
  www.energy.gov
- Nuclear Regulatory Commission
  www.nrc.gov
- World Nuclear Association
  www.world-nuclear.org

QUESTIONS?